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Educational Management Information Architecture under the Deep Learning Mathematical Model

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ABSTRACT

With the rapid development of artificial intelligence, it has been widely applied in various industries in recent years. It is a very important topic for courses, so we must continuously improve our course content. This article will study how to use artificial intelligence to establish an effective course management system to effectively disseminate our courses. Through a systematic exploration of deep learning mathematical models, we find that they can significantly change the teaching of courses. Through practical simulations, it can better help schools organize classroom content and inspire learners' enthusiasm for learning.

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1. Introduction

With the advent of the digital age, deep learning mathematical models have been proven to be a powerful technology that can help solve complex data processing tasks and greatly expand the visibility of data, thus greatly promoting data analysis, processing, and transmission, thereby greatly reducing the complexity of data. At the same time, it can greatly expand data visibility, thereby better meeting society's demand for data [1]. Deep learning technology imitates human thinking through mathematical models and the structure of the model, transforming complex geometric problems into operable models to achieve more accurate model recognition and more efficient model operation. The key is to use the structure of the model to effectively extract the characteristics of information to achieve better prediction and decision-making [2]. By using relevant technologies such as linear algebra, calculus, probability theory, and numerical computation, deep learning models can be effectively constructed. These models may involve confirming loss functions, applying backpropagation algorithms, and using regularization techniques to better understand the characteristics, behaviors, patterns, and structures of information. Through in-depth research, we find that using models for deep learning helps us understand the basics of algorithms and improves their efficiency. Deep learning technology's continuous development and popularization has successfully opened up a new way

of thinking and has been widely used in classrooms. Using this technology, we can effectively collect, integrate, and analyze a large amount of information to help teachers accurately grasp students' learning situations, behavioural performances, and inner psychological desires, thus effectively promoting the improvement and enhancement of courses. By using the mathematical models of deep learning [3], we can automate the management of courses and make intelligent decisions, thereby greatly improving the efficiency and quality of courses [4]. Although deep learning technology has been widely used in constructing courses, it still faces some challenging issues. Primarily how to ensure the effective transmission of students' data and prevent external encroachment of their sensitive information, especially for sensitive information that violates legal regulations, such as false sensitive vocabulary. To achieve the goals of courses, we must strengthen the implementation of mathematical models and conduct strict security checks on the data to maximize the protection of learners' interests. At the same time, we must also pay attention to the models' stability, accuracy, and other relevant technical indicators [5]. To better use deep learning technology to guide courses, we must carefully select the best algorithms and models to make them more accurate and reliable in completing tasks. In addition, we must continue to improve and enhance these models to better meet the needs of practice and enhance the courses' effectiveness. Through deep learning technology, we can better analyze the information architecture of course teaching, which is very important for improving teaching efficiency and quality. By using this technology, we can better manage courses and promote innovation and development [6].

2. Related Work

In recent years, with the development of technology, many Sub-Is have started incorporating deep learning into the design of courses, aiming to improve traditional teaching methods and stimulate students' innovative spirit to unleash their full potential. Lee developed a novel teaching evaluation system that utilizes the latest deep learning technology to effectively collect users' reading records and assess their learning performance. It promptly identifies shortcomings in classroom teaching, guides educators in the correct direction for teaching reforms, and ensures the quality of education [7]. Wang believes that applying deep learning algorithms to solve problems in courses not only improves the classroom teaching environment but also helps to grasp the learning content better, thus enabling more targeted guidance for students' reading and contributing to better academic performance. Sub-Is are researching how to use deep learning technology to improve the educational environment, such as the effective application of teaching content, monitoring classroom performance, and achieving excellent results in course content [8]. Additionally, Fantinato has developed an intelligent education resource push system that can effectively apply content according to learners' situations and precisely deliver classroom content based on learners' needs. By utilizing deep learning mathematical models, learners can find the best learning materials more quickly and optimize the utilization of the learned content, thereby enhancing the learning experience. Furthermore, relevant practices have demonstrated that deep-learning mathematical models are crucial for enhancing learners' understanding ability and improving teaching levels [9]. Wang states that by applying advanced deep learning algorithms, we can not only effectively analyze and process relevant information in courses but also better control the classroom atmosphere, leading to more targeted improvements in classroom learning and facilitating the better application of learners' learning achievements, thereby safeguarding learners' rights. However, we must pay attention to digital security, information integrity, and accurate and timely implementation [10]. By employing deep learning methods, we can improve the content and form of traditional courses and enhance their practical value. Moreover, it can help us gain insight into students' psychological characteristics and formulate reasonable educational methods, enabling us to provide the best cultivation for students. With the advancement of technology, an increasing number of researchers are integrating the concept of deep learning into the design of courses, intending to improve traditional courses and enhance students' comprehensive qualities and abilities. Through systematic investigation and analysis, we can recognize the significance of deep learning technology in courses and its tremendous potential.

3. Deep Learning Mathematical Model Design

3.1. Optimization of Deep Learning Mathematical Model Algorithms

Curriculum scheduling is a critical component of teaching management, as it relates to students'

learning situations and affects the classroom environment and even the usage of teaching equipment. To enhance the quality of education, the teaching management platform should provide an optimalcurriculum scheduling algorithm to achieve more effective course arrangements. By representing the data computation units through the optimal functions, we can make data calculations more accurate and efficient. Through the data application units, we can better utilize data and apply deep learning models to process various types of new data, such as learning data and teaching data, thereby improving teaching efficiency and enabling continuous data storage and communication. The focus of this study is on how to maximize the layout effectiveness of teachers in the classroom by optimizing the input-setting constraint functions and objective functions. To achieve this, we propose Formulas 1 and 2 to fulfill this objective.

$$e\left[e_1(y), e_2(y), \cdots, e_n(y)\right] = X_{\max} \tag{1}$$

$$\left[f_1(y), f_2(y), \cdots, f_m(y)\right], 0 \tag{2}$$

3.2. Construction of Deep Learning Model Flowchart

After the optimization of the algorithms as mentioned earlier, in the secondary judgment, if the arrangement meets the optimal solution, the course schedule can be immediately saved and completed. Conversely, suppose the arrangement does not meet the optimal solution. In that case, it needs to re-enter the second step and continue iterating until the optimal solution is found, and then it can be saved and exited. According to Figure 1, we can see the course algorithm design process. The course schedule formulated using this algorithm can meet the practical needs of students, teachers, and schools and is more efficient and flexible compared to traditional manual scheduling. Mind maps and deep learning make our course designs more diverse. Therefore, our management team no longer needs to worry about meeting different educational and training needs. Using this system, our administrators only need to input relevant information about classrooms, teachers, students, and classes to obtain a well-organized course plan. In addition, this system has high flexibility and is very suitable for making adjustments as needed.

3.3. Storage Algorithm Based on Deep Learning Model

We can achieve data exchange and sharing through the deep learning mathematical model. The advantage of this technology is that it can store teaching data through model algorithms and enable data exchange in a point-to-point manner. Additionally, the model can be used to store teaching data. By employing advanced algorithms (Formula 3) and network transmission technology, teaching data information is securely stored to ensure its reliability and availability. Teachers play a crucial role in transmitting teaching information, as they can help students select appropriate model nodes based on classroom content to access the required teaching materials. Furthermore, students can send their questions to different network nodes, and teachers can effectively communicate with students by accessing the network nodes they send, thereby better-grasping knowledge.

$$g(x, y) = \sqrt{\left(g_x(x, y)\right)^2 + \left(g_y(x, y)\right)^2} \tag{3}$$

4. Experimental Design and Analysis

4.1. Experimental Design

The first stage is data collection. To better collect data, we will apply deep learning technology. We will establish model-based access management, secure statistics, and homomorphic encryption data storage network platforms. The received data will be segmented into multiple parts, and then these parts will be aggregated. This will prevent third parties from stealing our data and stabilise our system. This large-scale database will present students' learning conditions based on different types, ages, majors, activity ranges, and geographical locations and effectively collect and organize this information to better meet users' needs. To ensure the accuracy and reliability of deep learning

evaluation, the "four basic principles" require full consideration of the school's intelligent construction and information construction conditions before building the model, continuous updating of data, increasing the number of models, and keeping up with the development trends of the times. With the continuous increase in "freshness," we must ensure the diversity of student data to utilize the potential of internal data fully. Moreover, to ensure the security and privacy of student data, we must strictly comply with the security specifications of the database in subsequent research and development. By introducing deep learning technology, we create a new network structure that divides traditional teaching resources into multiple parts, including information management, data storage, computing, and applications, enabling teachers to conduct distance and multimedia teaching and providing students with comprehensive assistance. With advanced big data analysis techniques, we can effectively process diverse educational resources, including classroom content, faculty, and school resources. We can use these resources to build an efficient machine-learning system that can effectively handle these resources to achieve the expected results. Furthermore, we can visualize all resources using these machine learning systems for better utilization.

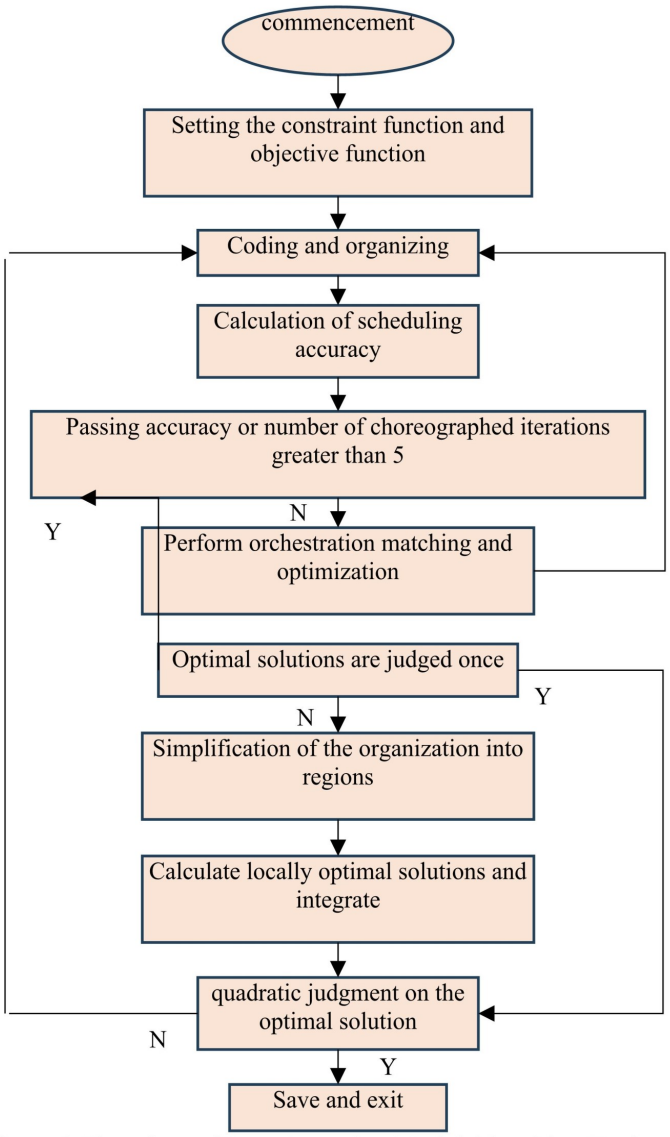

Figure 1. Flowchart of Deep Learning Model Algorithm Design

4.2. Analysis of Experimental Results

We conducted an actual comparative experiment to verify whether our course arrangement is sound and accurate. We will use the simulated annealing algorithm and ant colony optimization as the objects of actual implementation and combine them according to different requirements using MATLAB software. In four sets of actual implementation experiments, we will adopt different methods and use the actual implementation results as the basis for practical implementation. By comparing the four groups of experiments, we can see that all three methods can effectively cope with hardware limitations to meet the requirements of course arrangements. Additionally, we can observe that the application frequency of ant colony optimization is relatively low, while the application frequency of the simulated annealing algorithm is relatively high. After comparing the four groups of experiments, we found that the calculation proposed in this study has strong stability, slightly less than the ant algorithm, and slightly less than the simulated annealing algorithm. Furthermore, the average lifespan of the three calculations is also different. Still, we found that the ant colony algorithm has a longer lifespan, while the simulated annealing algorithm has a shorter lifespan. According to the performance in Figure 2, we found that the teaching plan we constructed can significantly improve the learning experience, with higher accuracy compared to other schemes, and can reduce the number of rule violations by 20% to 50%, making the learning experience more flexible and reducing the overall cost of the learning process by 15% to 30%. Using mind mapping technology, managers can input relevant data on school facilities, faculty, etc., into the system and use the system to set precise courses to achieve better learning outcomes, better serve the needs of teachers, and significantly improve the educational level of the school. Through actual testing, we found that when using 1000GB of data in Figure 3, the communication between classrooms and schools using blockchain communication technology is highly effective. We found that the information leakage rate of this method is very low, even less than 20%. With blockchain technology, we can shorten data transmission to 4 seconds, greatly reducing the transmission time of traditional network information processing. Moreover, we also found that data transmission using this technology is almost 100%, indicating that our method can effectively handle and transmit educational resources.

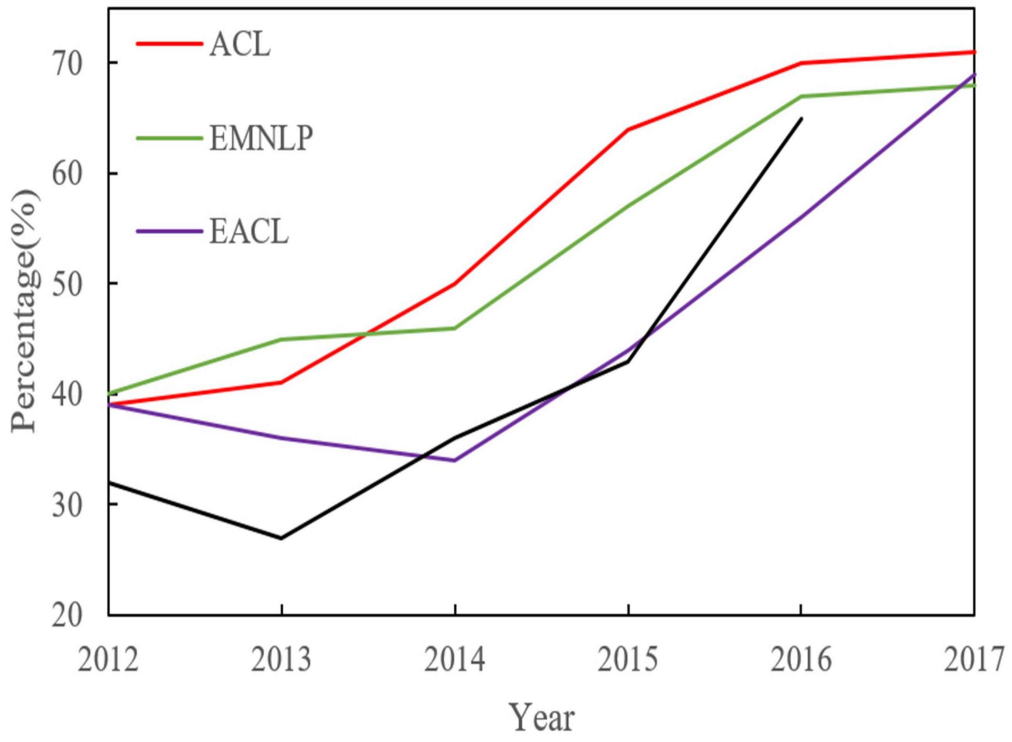

Figure 2. Accuracy Operating Data Chart

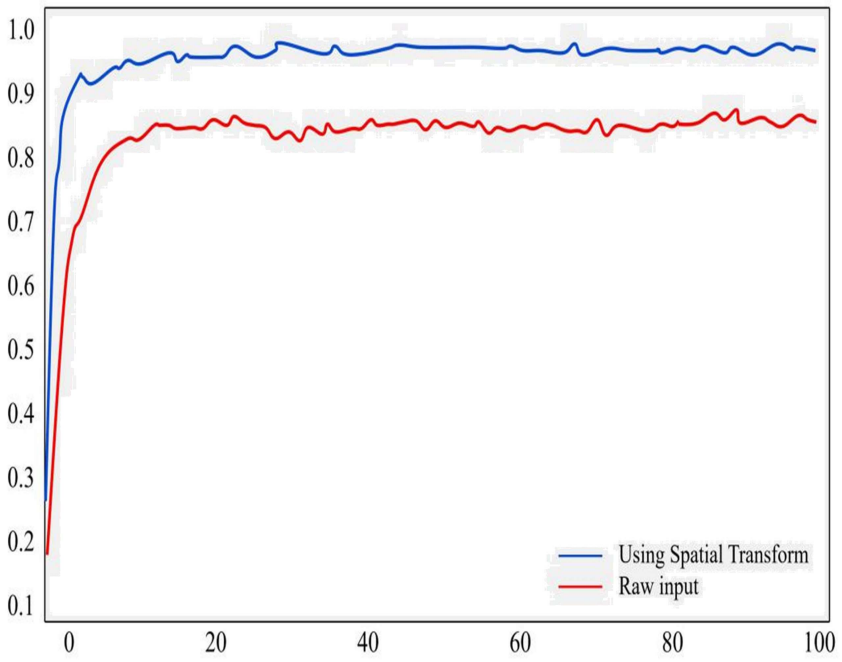

Figure 3. Comparison of Different Interaction Technologies

5. Conclusion

This article mainly discusses using artificial intelligence (AI) technology to construct deep learning mathematical models to improve learning outcomes. Through data analysis of learners, it is found that AI technology can bring many benefits to learning. With AI technology, we can conduct in-depth research on students' learning situations and design targeted teaching strategies based on this information. Additionally, we can use this technology to evaluate the quality of education courses and propose valuable suggestions to improve our teaching level. Through in-depth research, we can assess the quality of courses from multiple dimensions, including but not limited to their difficulty, students' enthusiasm, and learning performance, to better identify problems and propose targeted solutions.

Although AI technology has achieved certain educational results, some challenges and limitations remain. Firstly, more data support is needed due to the relatively limited data on ideological education. Secondly, to better implement AI technology, more technical personnel and teams with different levels of capabilities are needed, thus requiring enhanced training and management. In summary, AI technology brings a new educational perspective. It not only allows better insight into students' learning situations and meets their learning needs but also effectively enhances the quality and effectiveness of courses. However, we must also strengthen the management and training of AI technology to ensure it can play its maximum role and achieve the greatest benefits.

The research results of this article will provide important guidance for the development of education and encourage scholars and practitioners to actively participate and jointly explore more innovative models of education to promote its development.

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